MEMORANDUM NO. G18-6

Reviewed 8/27/81

DATE: AUGUST 21, 1981

TITLE: ST. LOUIS PARK GROUNDWATER CONTAMINATION STUDY - SUMMARY OF GRADIENT CONTROL WELL DISCHARGE QUANTITIES

ABSTRACT: A GRADIENT CONTROL WELL SYSTEM IS PROPOSED TO REMEDY GROUNDWATER CONTAMINATION OF THE MIDDLE DRIFT, PLATTEVILLE, ST. PETER, PRAIRIE DU CHIEN-JORDAN AND MT. SIMON-HINCKLEY AQUIFERS AS RELATED TO THE FORMER REPUBLIC CREOSOTE SITE IN ST. LOUIS PARK, MINNESOTA. THIS MEMORANDUM SUMMARIZES THE GRADIENT CONTROL WELL DISCHARGE QUANTITIES AND LOCATIONS AND REPRESENTS COMPLETION OF TASK 2060 OF THE REFERENCED PROJECT. A BRIEF DESCRIPTION OF THE CORRESPONDING REMEDIAL PLAN(S) FOR EACH AQUIFER IS ALSO PROVIDED.

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SUMMARY OF GRADIENT CONTROL WELL DISCHARGE QUANTITIES

This memorandum summarizes the gradient control (or "interception" or "recovery") well discharge quantities proposed to remedy the St. Louis Park groundwater contamination problem. The discharge quantities were determined from an analysis of gradient control well system design performed subsequent to the April 1981 memorandum "Conceptual Analysis and Design of Gradient Control Well System" produced under task numbers 2010 and 2030. The new analysis incorporates updated water quality and hydrologic parameter information, and considers the possible utilization of non-municipal wells and the effects of a buried bedrock valley.

The aquifers considered in the analysis are the Middle Drift, Platteville, St. Peter, Prairie du Chien-Jordan and Mt. Simon-Hinckley. A brief description of the remedial action plan(s) proposed for each of these aquifers is presented below. The locations of proposed gradient control wells are shown in Figure 1 and the corresponding average discharge rates are summarized in Table 1. Details of the analysis used to select the well locations and discharge rates will be documented in the memorandum on the gradient control system produced under task number 2120.

Mt. Simon-Hinckley Aquifer

Groundwater contamination of the Mt. Simon-Hinckley 800'-1000' is assumed to be localized in the vicinities of the on-site Hinckley (W23) and Milwaukee Railroad (W38) multi-aquifer wells. Groundwater movement in the aquifer is governed by pumping induced gradients since there is no identified regional flow trend. St. Louis Park (SLP)

municipal wells 11, 12 and 13 are Mt. Simon-Hinckley wells in close enough proximity to exert pumping induced gradients in the contaminated zones and thus influence the movement of this water. In the past decade, groundwater flow within the area has been convergent toward SLP 11 since it has maintained the highest discharge rate of the three municipal wells. Based on 1979 and 1980 total pumpage records, the present average pumping rates for these wells are about 600 gallons per minute (gpm) for SLP 11 and roughly 300 gpm for SLP 12 and 13 each. Three remedial plans for the Mt. Simon-Hinckley were considered, all of which necessitate continued heaviest pumpage by SLP 11 or by newly constructed recovery wells nearer the assumed sources of contamination.

The first plan is to continue the present 1979-1980 pumping pattern in the aquifer with an average discharge of 600 gpm or greater from SLP 11 and average discharges from SLP 12 and 13 at rates up to one-half that of SLP 11. In so doing, contaminated groundwater originating at the two multi-aquifer wells will continue to move towards and eventually be withdrawn by SLP 11. This well would then require treatment in order to continue providing municipal water supply.

The second plan is the rapid recovery of contamination by two proposed recovery wells, R-W23 and R-W38, constructed adjacent to the Hinckley (W23) and Milwaukee Railroad (W38) wells, respectively. To insure convergent flow of contaminated groundwater toward the recovery wells, they should be pumped equally at an average rate of 300 gpm or greater each, use of SLP 11 should be discontinued possible? and the average discharges of SLP 12 and 13 should not exceed half the combined discharge of the recovery wells.

The third remedial plan is to withdraw all contaminated groundwater through one recovery well, RW2, located midway between the Hinckley (W23) and Milwaukee Railroad (W38) wells. Again, to insure that flow of contaminated groundwater converges toward the recovery well, it should be pumped at an average rate of 600 gpm or greater, SLP 11 should be shut down and wells SLP 12 and 13 should be used at rates less than or equal to half that of the recovery well.

Prairie du Chien-Jordan Aquifer

Eastward trending groundwater flow through the Prairie du Chien-Jordan aquifer occurs in the St. Louis Park area. Two remedial plans were considered in which the eastward flow of contaminated groundwater would be intercepted and withdrawn by wells. The first plan is to maintain average discharges of 800 gpm from SLP 4, 1000 gpm from the Park Theater well (W70) and 1500 gpm from old SLP 1 (W112). The second plan is to pump the Park Theater and SLP 4 wells at average rates of 1000 gpm and 800 gpm, respectively, and construct a new well, RW1, just east of Bass Lake, to be pumped at an average rate of 800 gpm.

The new well RW1 effectively replaces the interception performance of old SLP 1 (W112) in the first plan, but use of old SLP 1 (W112) would also be beneficial in the second plan since it would withdraw groundwater of suspected highest contamination. In conjunction with either of these plans, it is suggested that (1) municipal demands be partially met by treating a combined discharge of 800 gpm or greater from SLP 10 and 15 and (2) heavy use of wells located on or near the northern, southern and western

extent of contamination (i.e. SLP 5, 6, 7, 9, 14, 16 and Hopkins 3) be discouraged. This additional action will tend to contract the contaminant plume and allow a somewhat shorter cleanup duration.

St. Peter Aquifer

As in the Prairie du Chien-Jordan aquifer, groundwater flow through the St. Peter is generally west to east in the St. Louis Park area. The eastward flow of contaminated groundwater could be collected by one well, RW3, located just west of Bass Lake, pumping at an average rate of 300 gpm. This well would also capture groundwater which may enter the St. Peter from the overyling Platteville or Middle Drift aquifers through the bedrock valley assumed to exist in the vicinity of Wooddale Avenue between Highways 7 and 100.

Platteville Aquifer

The presently known contamination of the Platteville could be remedied through the use of two new wells and one existing well. The first new well, RW4, would be pumped at an average rate of 150 gpm to intercept the southeast flow of contaminated groundwater toward the assumed bedrock valley. The second new well, RW5, located near the western edge of Bass Lake, would be pumped at an average rate of 75 gpm to intercept the eastern flow of contaminated groundwater observed to the north and east of the bedrock valley. The third well is the existing well W100, which would be pumped at 50 gpm to retrieve what is presently believed to be local contamination due to seepage from the adjacent storm water pond.

Middle Drift Aquifer

Natural groundwater movement through the Middle Drift aquifer is generally eastward in the contaminated area. Similar to the remedial plan for the Platteville, three wells are proposed for withdrawal of the contaminated groundwater. The first well, RW6, would be pumped at an average rate of 125 gpm to intercept contaminated groundwater moving eastward toward the presumed bedrock valley. A second well, RW7, located east of the presently known extent of contamination, would be pumped at a rate of 75 gpm to intercept contaminated groundwater observed to the north and east of the bedrock valley. The third well, existing well W2, would be pumped at 50 gpm to withdraw local contamination due to the adjacent pond.

An independent alternative being considered in the Middle Drift aquifer is the use of a pumpout well near well W13 to remove the most heavily contaminated groundwater. A pumping rate of 10 gpm is presently proposed for this well.

NON-RESPONSIVE

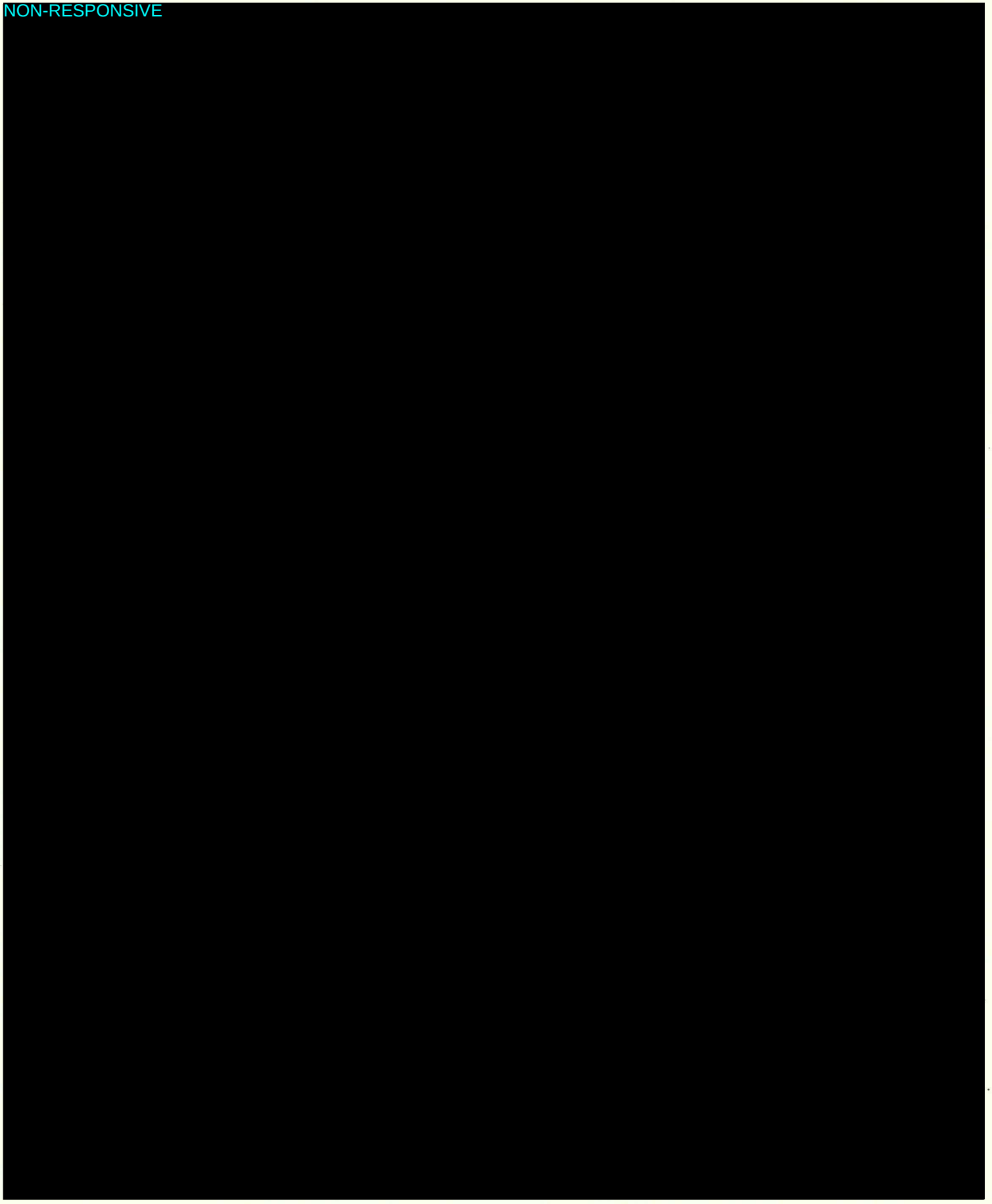

Table 1

SUMMARY OF REMEDIAL PUMPING PLANS

Aquifer	Plan	Well	Discharge (gpm)
Mt. Simon-Hinckley	1	SLP 11†	600
	2	R-W23*	300
		R-W38*	300
	3	RW2*	600
Prairie du Chien-Jordan	1	SLP 10,15 (combined)	800
		Park Theater (W70)	1000
		SLP 4	800
		Old SLP 1 (W112)	1500
	2	SLP 10,15 (combined)	800
		Park Theater (W70)	1000
		SLP 4	800
		RW1*	800
St. Peter	1	RW3*	300
Platteville	1	RW4*	150
		RW5*	75
		W100	50
Middle Drift	1	RW6*	125
		RW7*	75
		W2	50

† SLP denotes St. Louis Park municipal well

* Proposed new well

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August 21, 1981

Mr. Michael Convery
Minnesota Department of Health
717 SE Delaware Street
Minneapolis, MN 55440

Re: St. Louis Park Groundwater Contamination Study

Dear Mike:

Enclosed is the memorandum documenting discharge quantities from the proposed gradient control well system. We would be happy to discuss this with you if you have any questions.

Sincerely,

EUGENE A. HICKOK AND ASSOCIATES

John B. Erdmann

John B. Erdmann, P.E.

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Mike,
This is also being copied directly to Rick and USGS. John